REMARKS

The above-captioned application along with the following remarks are being submitted as a full and complete response to the Office Action dated September 30, 2005. In view of the above amendments and the following remarks, the Examiner is respectfully requested to give due reconsideration to this application, to indicate the allowability of the claims, and to pass this case to issue.

Status of the Claims

Claims 1-2, 5-6, 11-12 and 15-24 under consideration in this application. Claims 3-4 and 13-14 are being cancelled without prejudice or disclaimer. Claims 1-2, 5-6, 11-12, 15-16, 17 and 19 are being amended, as set forth in the above marked-up presentation of the claim amendments, in order to more particularly define and distinctly claim Applicants' invention. New claims 21-24 are been added to recite other embodiments described in the specification.

The claims are being amended to correct formal errors and/or to better disclose or describe the features of the present invention as claimed. All the amendments to the specification and the claims are supported by the specification, especially the drawings. Applicants hereby submit that no new matter is being introduced into the application through the submission of this response.

Allowable Subject Matter

Claims 17-20 would be allowed if rewritten in independent form to include the limitations of the base claim and any intervening claims.

As claim 17 is being rewritten in independent form to include the limitations of claim 11, and claim 19 in being written to include all limitations in claim 12 and to depend from claim 17, claims 17-20 are in condition for allowances.

Prior Art Rejections

Claims 1-4 and 11-14 were rejected under 35 U.S.C. § 102(e) as being anticipated by US Patent No. 6,627,883 to Wang et al. (hereinafter "Wang"), and claims 5-6 and 15-16 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Wang and further in view of US Patent No. 5,652,427 to Whitehouse et al. (hereinafter "Whitehouse"). These rejections have been carefully considered, but are most respectfully traversed.

The mass spectrometer of the invention for example, the embodiment depicted in Fig. 1), as now recited in claim 1, comprises: an ion source 1 which generates ions; a mass filter 8 which selects ions of a desired mass-to-charge ratio; a 3D quadrupole ion trap 9 including a ring electrode 24 and a pair of endcap electrodes 23, 25 (p. 17, lines 12-24), in which the selected ions are fragmented into ion fragments; a Time-Of-Flight Mass Spectrometer (TOFMS) 18 for accelerating the ion fragments towards a detection means and measuring time-of-flights of the ion fragments; and a controller which switches off an RF voltage applied to the ring electrode (p 2, lines 14-17) and then applies a DC potential to the ring and endcap electrodes 23, 24, 25 so as to eject the ion fragments from the ion trap 9 into the TOFMS 18 (p 17, lines 13-24). In other words, an RF electrical field is generated in the direction of the axis of the ring electrode and three dimensionally so as to force ions to the center of the ion trap (see p.16, lines 18-19 and thereby trap and store ions therein).

The invention recited in claim 11 is directed to a mass spectrometric method implemented by the mass spectrometer recited in claim 1.

"*In the mass spectrometer combining the ion trap and the TOFMS, the quadrupole element is disposed at the front of the ion trap, at which isolation is performed. This structure enables the gas pressure inside the ion trap to be set in the region, where ion trapping efficiency, mass resolution, and CID efficiency are simultaneously maximized. On the other hand, the gas pressure inside the quadrupole element can be set to a relatively low level appropriate for isolation.*" This makes ion trapping efficiency, mass resolution, and CID efficiency improved simultaneously (p. 28, line 8 to p. 29, line 1; Fig. 4).

Applicants respectfully contend that none of the cited references teaches or suggests such "a ***3D*** quadrupole ion trap including a ring electrode 24 and a pair of endcap electrodes 23, 25, in which the selected ions are fragmented into ion fragments" as in the invention.

In contrast, Wang's ion trap is not a 3D ion trap, but a 2D ion trap (linear ion trap). Wang's ion trap 161 is comprised of a plurality of (e.g., four, five, six, etc.; Figs. 6-7) conducting electrode rods 195 arranged in parallel (rather than "a ring electrode and a pair of endcap electrodes") to form a linear (Abstract; col. 20, line 7) multipole structure (e.g., quadrupoles, pentapoles, hexapoles, octapoles, etc.) (Abstract; col. 17, lines 9-12).

In addition, Wang applies RF potentials between the rods of the multipoles 161 to force ions toward the axis of the multipoles and thereby guides them from the entrance end to the exit end of the apparatus (col. 11, lines 12-15). There is simply NO RF electrical field generated in the direction of the axis of the multipoles (i.e., a horizontal direction of Fig. 6) in Wang.

Moreover, Wang ejects ion pulses by applying an RF voltage to the ion trap for mass analysis by TOF (col. 17, lines 2-5), rather than "by switching off the RF voltage applied to the ring electrode and then applies DC potential to the ring and endcap electrodes" as does the invention.

Applicants respectfully contend that none of the cited references teaches or suggests such "a mass filter 8 which control a second gas pressure therein independently from a first gas pressure inside the ion trap 9" as recited in claim 2 of the invention.

Whitehouse was relied upon by the Examiner to teach a multistage quadrupole where each stage is independently pumped to control the pressure in each stage by incorporating Wang's the multistage mass filter thereinto. In Wang and Whitehouse, there is simply no description of controlling gas pressure of ion trap and mass filter separately.

Moreover, the differential pumping described in Wang and Whitehouse is a general way for pumping to needed pressures at low cost, wherein the gas pressure of each region becomes **lower** from an atmospheric side (the ion source side) to the mass spectrometer. Whitehouse varies air pressures in the multiple pumping stage multipole ion guides by their configurations, i.e., rod diameter and rod spacing and the vacuum pumps (col. 5, lines 14-40; Fig. 1). The gas pressure is higher at the beginning pumping stage and then decreasing through subsequent pumping stages ("*the rod diameter and rod spacing in the multipole ion guide assemble were configured small enough to minimize the transmission of neutral gas through the ion guide into down stream pumping stages*" col. 5, lines 20-26). For example, the pressure in the 1st vacuum stage 7 is maintained at 0.4 to 20 torr, the pressure in the 2nd vacuum stage 12 is maintained at 5 to 200 millitorr, the pressure in the 3rd vacuum stage 20 is maintained at $1*10^{-3}$ to $8*10^{-5}$ torr (col. 8, lines 1-25). As such, the gas pressure in the second-stage is lower than those inside the first-stage, and the gas pressure in the third-stage is lower than those inside the second-stage ($1^{st} > 2^{nd} > 3^{rd}$).

On the other hand, the gas pressure inside the ion trap 9 is set to be **higher** than the gas pressure inside the mass filter 8 which is closer to the ion source side (Fig. 4; p. 20, line 14 – p. 21, line 15). It is well established that a rejection based on cited references having contradictory principles or principles that teach away from the invention is improper. Further more, the gas pressure inside the second stage quadrupole is lower than those inside the first stage and the third stage quadrupoles ($1^{st} > 2^{nd}$ & $3^{rd} > 2^{nd}$) as recited in claim 5 of the invention.

Contrary to the Examiner's assertion that "the pressure in region (168) is held at 4x10^-5 mbar and that the pressure in region (164) is set to 4x10^-3 mbar when operating in MS/MS mode (p. 4, end of 3rd paragraph of the outstanding Office Action)," Wang only describes the pressures of the regions 164 and 168 are the same (col. 20, lines 9-10). In the MS/MS mode, the second trap is filled with a collision gas to a pressure of 0.004 mbar (col. 11, lines 31-33), while there is no description of the pressure of the first trap here. As such, Wang does not teach "the gas pressure in the mass filter region is lower than the gas pressure in the ion trap region" as asserted by the Examiner.

The Examiner further asserted that (p. 5, 4th paragraph of the outstanding Office Action) says "(1)Wang et al. teaches all the required limitation of claims 1, 2, 11, and 12 as pointed out above, and (2) further teaches a multi-stage mass filter comprising three independently controllable quadrupole elements (186, 185, and 188 and Col. 16 lines 45-63)". As to (1), there are differences between our invention and Wang in terms of the ion trap 9 and the gas pressure mentioned above. As to (2), Wang only teaches that each section may be held at a different potential (col. 16, lines 59-60), rather than at a different gas pressure.

Applicants contend that none of the cited references discloses each and every feature of the present invention as disclosed in independent claims 1 and 11. As such, the present invention as now claimed is distinguishable and thereby allowable over the rejections raised in the Office Action. The withdrawal of the outstanding prior art rejections is in order, and is respectfully solicited.

Conclusion

In view of all the above, clear and distinct differences as discussed exist between the present invention as now claimed and the prior art reference upon which the rejections in the Office Action rely, Applicants respectfully contend that the prior art references cannot anticipate the present invention or render the present invention obvious. Rather, the present invention as a whole is distinguishable, and thereby allowable over the prior art.

Favorable reconsideration of this application is respectfully solicited. Should there be any outstanding issues requiring discussion that would further the prosecution and allowance of the above-captioned application, the Examiner is invited to contact the Applicants' undersigned representative at the address and telephone number indicated below.

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December 22, 2005

SPF/JCM/JT